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ABSTRACT

The development and use of item shells in the construction of a series of standardized tests of reading comprehension at the elementary school level are described. An item shell is an item that is devoid of specific content, but contains key words and a distinctive syntactic structure. The specific content of the item shell varies depending on the context on which the item is based. Once developed, item shells can be used to generate a pool of items. Sample item shells were developed at the Ottawa Roman Catholic Separate School Board in preparation for construction of board-wide examinations in reading comprehension for grades 3, 6, and 8. Nine of the 22 sublevels of the taxonomy of B. S. Bloom (1981) were used as reading comprehension objectives. These objectives were grouped according to Bloom's six levels: (1) knowledge; (2) comprehension; (3) application; (4) analysis; (5) synthesis; and (6) evaluation. An average of three shells, built from a pool of available items found in similar tests, were built for each objective, for a total of 120 items. These were submitted to six educators for classification according to the cognitive skill each was intended to measure. Pilot versions were tested using 360 students, and shells that produced sound items and were classified by three experts were considered valid. The item shells were open enough for use at all three grade levels, but were less flexible with the lower grades. Test writers found that the structure of the shells allowed sufficient creative freedom and encouraged them to construct new item shells. (SLD)

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Use of Item Shells to Construct Higher Level Test-Items In Reading Comprehension

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Paper presented at the annual meeting of the American Educational Research Association, San Francisco, 1989.

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Introduction

Ever since Bloom created the taxonomy of educational objectives involving higher thinking skills, there has been interest in the evaluation of these skills. To date, educators and practitioners in measurement have been presented with guidelines and procedures for writing higher level test-items (Bloom, Hastings & Madaus, 1981; Haladyna & Roid, 1982; Haladyna, Shindoll and Law, 1987). These technologies include the use of algorithms (Bormuth, 1971), facets (Guttman, 1969), item forms (Hively, Patterson & Page, 1969) and item shells (Haladyna, Shindoll and Law, 1987).

It would appear that the use of item shells in the construction of test-items may be more flexible and appropriate than the other techniques because it accelerates the test construction process while providing enough latitude for creativity and variety (Haladyna, Shindoll and Law, 1987). Haladyna et. al., (1987) explain that when using item shells, item writer can concentrate on creating test-items without worrying about their syntactic structure or their face validity.

The study reported here describes the development and use of item shells in the construction of a series of standardized tests in reading comprehension at the elementary level.

Definition of Item Shells

An item shell is a item devoid of specific content but containing key words and a distinctive syntactic structure (Haladyna et al., 1987). The specific content of the item shell varies depending on the context on which the item is based. To produce an item in reading comprehension, one fills in the shell by varying the contextual information on the basis of the related texts and provided cues. Once developed, item shells can be used to generate a pool of items.

Development of Sample Item Shells

Sample item shells were developed at the Ottawa Roman Catholic Separate School Board in preparation for the construction of board-wide exams in reading comprehension for grades 3, 6 and 8. Educational objectives based on the six levels of Bloom's taxonomy (i.e. Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation) were first selected and approved by educators from the Board during the school year 1987/88. The taxonomy form the basis of a thinking skills program at the Board. Only 9 of the 22 sublevels of the taxonomy were included in the exams, however, because large-scale objective tests make it difficult to measure certain higher thinking skills.

An average of 3 shells were written for each objective. The shells were built from a pool of available items found in similar tests. A total of 120 items were constructed using the initial item shells. The items were then submitted to six educators who were asked to classify each item according to the level of cognitive skills it was intended to measure. These educators are responsible for teaching a thinking skill program at the Board's teacher center.

Pilot versions of the tests were constructed and were administered to two groups of students from each of the three grades. This represented a total of 360 students. Those shells that produced sound items (based on classical item analyses) and that were unanimously classified by the three experts, were considered valid shells and were subsequently used in the construction of other series of tests. In general, items received only minor revisions and the shells were modified accordingly.

Presentation of Item Shells

This section presents the nine reading comprehension objectives selected for the tests and some of the item shells that were found to be congruent with these educational objectives.

KNOWLEGDE

Objective #1:
Recall of specific facts in the story just read.

Item shells:

1. To whom is (a character in the story) writing this (letter, invitation, card)?

2. What did (name of one character in the text) said to (another character in the text) when (at a specific point in time)?

Objective #2:
Recall of patterns of organization that deal with specific information.

Item shells:

1. Name the part of the letter in which (a specific fact from the text) is found?

2. What (types of literary genres or functional prose, i.e. poetic, journalistic) trait is found in this text?

COMPREHENSION

Objective #3:
Define a word or an expression from the text in the light of its context.

Item shells:

1. What is meant by the expression (expression taken from text)?

2. Which of the following synonyms could replace the expression "(expression taken from the text)"?

Objective #4:
Explain or summarize a section of the text.

Item shells:

1. Which of the following statements summarizes the text?

2. What is the purpose of (an action, a situation, a character in the text)?

APPLICATION

Objective #5:
Use an abstraction that may be in the form of a general idea, a rule of procedures, or a generalized method, in a new situation.

Item shells:

1. From what you have learned about (literary genres or functional prose, i.e. greeting cards), write a different (message, letter, card) for (another friend, person) in which you express a wish.

2. From what you have learned about (literary genres or functional prose, i.e. comic strips), complete the following (frame, message, text) so as to indicate (an emotion, an action).

ANALYSIS

Objective #6:
Establish the order of events in the reading passage.

Item shells:

1. Find the group of facts that gives the order of events in the text.

2. What does (a character in the text) do in the (sequence of one event) place in the text?

Objective #7:
Differentiate between the main and secondary ideas of a text.

Item shells:

1. Here are two secondary ideas taken from the text.

(Two secondary ideas from the text)

On the basis of these statements, find the main idea.

SYNTHESIS

Objective #8:
Combine elements from the text in such a way as to constitute a pattern not clearly there before.

Item shells:

1. By combining the various (elements, suggestions, facts) in the text write a (slogan, title, abstract) pertaining to the text.

2. End the story by describing what happens to (main character or object in the text).

3. Add a new (stanza, advice, proof, argument etc.) to the text taking into account the various elements in that text.

EVALUATION

Objective #9:
Judge the value of material on the basis of provided criteria.

Item shells:

1. On which (personality trait, incident, etc.) does the author put the most emphasis?

2. Which of the following statement taken from the text is the least substantiated in the story?

3. Which of the following adjectives best describes (the feelings, emotions, overall impressions) expressed in the text?

Overall Evaluation of The Study

Here are some observations that are worth mentioning:

a) Although most item shells were open or hollow enough to be adapted to the three grade levels, there seemed to be less flexibility when they are used in the lower grades. One reason may be that for this grade level item stems must be short, thus limiting the number of key words.

b) It was found that item shells could be easily used to construct multiple-choice items for most levels of the taxonomy except for the levels of application and synthesis. It was recommended that only short-answer questions be written for these two levels.

c) The experts on Bloom's taxonomy agreed among themselves on their classification of the test-items but expressed some concern on those items and corresponding item shells that were intended to measure application skills. The difficulty seems to stem from the fact that students can only apply principles, rules, or procedures once they have learned and internalized them. Therefore the application of these in new situations should be spontaneous rather than dictated. The items may turn out to be verification exercises at the level of comprehension rather than a measure of application skills. They also assume that the students have previously been exposed to the content.

c) Item shells can be used for writing items on a variety of literary genres and functional proses.

d) Test-writers found that the structure of the shells allowed enough creative freedom and encouraged them to construct new shells.

Implications for Future Studies

This document offers a tool that should facilitate and accelerate the production of items to measure higher thinking skills in the area of reading comprehension. It also suggests a number of studies on item shells and their uses. To begin with, the validity and the reliability of the item shells just presented and item shells based on other taxonomies should be investigated more rigorously. Secondly, the use of shells could perhaps be extended to distractors when constructing multiple-choice items and to the other 13 objectives not covered in this paper. Third, researchers may also be interested in empirical studies on the advantages of the technique, such as its flexibility and the ease with which items-writers and inexperience teachers can use item shells particularly in the measurement of the higher level of cognitive skills.

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